Learning Disabilities: A Contemporary Journal 20(2), 129-148, 2022 Copyright @ by LDW 2022

# Writing Interventions for Students with Learning Disabilities: A Scoping Review

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*This scoping review provides a comprehensive overview of available experimental research on writing interventions for K-12 students with learning disabilities (LD). After conducting a systematic search across multiple databases, journals, and previous meta-analyses, we located a total of 194 studies. Each study included in this review met the following criteria: (1) used an experimental, quasi-experimental, or single-subject design; (2) involved a writing intervention; (3) focused on participants who were K-12 students with LD; (4) reported at least one assessment of student writing outcomes at posttest; and (5) was published in English. We coded each study for study-level, participant, intervention, and outcome characteristics. We found a declining rate of publication in the studies we reviewed. A majority of studies (58%) involved group designs, and, on average, study participants were in the middle grades (M = 6.48, SD = 2.36). Half of all studies were conducted in special education settings and most (76%) focused on discourse-level (i.e., extended composition) writing interventions. However, many of the included studies did not report important demographic, setting, and interventionist characteristics. Results from this scoping review provide a wide-angle view of the current field of writing interventions for students with LD and highlight areas where additional research may be necessary.*

***Keywords:*** **writing, intervention, learning disabilities, scoping review, K-12 students**

## Introduction

Academic success for K-12 students requires proficient skills in writing. Whether it is asking students to complete short answer questions, take notes, use writing as a tool to learn, or compose an essay, writing in some form is expected in classrooms across the U.S. regardless of grade level or content area (Applebee & Langer, 2011; Brindle et al., 2016; Gillespie Rouse et al., 2021; Graham et al., 2014; Kiuhara et al., 2009; Wilcox et al., 2016). Beyond the classroom, writing is a foundational skill for personal communication and expression, and it is also critical throughout college and in the workforce (Beaufort, 2008; Graham, 2019). However, colleges and corporations alike report that incoming recruits lack the writing skills needed to be successful in their positions (National Commission on Writing, 2003; 2004).

In response to the need for capable writers, many states have increased their expectations for student writing. The development of the Common Core State Standards (CCSS; National Governors Association Center for Best Practices, Council

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of Chief State School Officers, 2010) and accompanying standardized yearly assessments is representative of this shift toward greater emphasis on writing and greater rigor in its assessment (Graham & Harris, 2015; Troia & Graham, 2016). The CCSS for English Language Arts include an emphasis on explanatory, opinion, and narrative writing beginning in kindergarten. As students move to higher grades, there are increasing expectations for both the quantity and quality, or sophistication, of their writing in each of these genres. Standards for research, which require students to use research skills to gather information for writing, are also included at each grade level (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010). The implementation of the CCSS writing standards has also initiated new assessments for students' writing. These assessments focus on both formative and summative evaluations of writing and more challenging tasks, such as students writing from textual sources (Shanahan, 2015).

Although the CCSS have encouraged more writing for students, there are important caveats. First, the standards can give the appearance of sequential, linear writing development; however, writing development differs for each student. Indeed, writing development has been found to vary by several demographic variables, including disability status, gender, race or ethnicity, and linguistic background (e.g., Fitton et al., 2021; Graham et al., 2017; Keller-Margulis et al., 2015, 2016). Second, there are gaps in the standards when considering the range of skills needed for successful writing. For example, handwriting and spelling are mentioned explicitly in the CCSS for elementary grade levels but are not included in later grades (Troia & Olinghouse, 2013). These transcription skills are crucial to students' writing competency, as difficulties with one or more aspects of written expression can affect overall writing development (Berninger et al., 2002; Kim & Schatschneider, 2017; Wagner et al., 2011).

One framework for understanding the interplay between multiple aspects of written expression is the levels of language framework which includes three distinct, although related, levels of written language (Abbott et al., 2010; Wilson et al., 2017). First is the letter and word level, which includes developing skills related to handwriting, typing, and spelling. Second is the sentence level, which encompasses composing sentences and applying grammatical rules for writing. The third and final level of language is the discourse level, which includes composing paragraphs or longer passages. Each of these levels can influence one another: Adequate development at one level can promote increases at another level. For example, increases in handwriting and spelling at the word level are related to increases in writing production and quality at the discourse level (Kim & Schatschneider, 2017; Kim et al., 2011). Additionally, previous research has shown that when accommodations are provided, such as the use of a word processor to remove letter or word-level barriers, students improve in their composition quantity and quality (Jozwik et al., 2020; Morphy & Graham, 2012; Perelmutter et al., 2017).

Given the complexities of written expression, instruction should be provided to students across each level of language to ensure they receive the needed supports for skill and composition development. Unfortunately, instruction using best practices for writing is still largely missing and incomplete in classrooms (Graham, 2019; Wang & Matsumura, 2019). Teachers have reported using few evidence-based

practices for writing instruction (Gilbert & Graham, 2010; Kiuhara et al., 2009) and few accommodations for struggling writers (Graham et al., 2016). When teachers applied accommodations, few were used daily and teacher experience was related to application of these accommodations (i.e., more experienced teachers used more accommodations for struggling writers in their classrooms; Graham et al., 2016). Across grade levels and areas of specialization, teachers reported they were not well-prepared to teach writing in their university preparation programs and many reported having to undertake their own preparation to learn to teach writing (Cutler & Graham, 2008; Graham et al., 2014; Kiuhara et al., 2009). Furthermore, compared to general education teachers, special education teachers reported less preparation to teach writing and less positive attitudes about teaching writing (Graham et al., 2022).

### *Writing Instruction for Students with LD*

A lack of instruction in writing can be particularly detrimental for students receiving special education services, including those with learning disabilities (LD), who often experience early and persistent difficulties with aspects of written expression. Although growth and gradual improvement in writing is typically seen as students continue through school (Keller-Margulis et al., 2015), many students with LD struggle to make progress comparable to their peers without disabilities. They often display weaker transcription skills, spend little time planning for or revising their writing, and lack the executive function skills needed to juggle the multiple processes involved in skilled writing (Santangelo, 2014). These challenges are evident in writing assessments, where students with LD tend to show lower performance than students without disabilities on multiple measures of writing, including handwriting, spelling, sentence fluency, and overall writing quality (Graham et al., 2017).

Considering the importance of supporting writing development for students with LD, clear guidance is needed on best practices for instructing these students to write. To identify evidence-based practices, researchers have conducted systematic reviews and meta-analyses. Typically, these reviews have been limited to specific aspects of studies, such as a single research design (Rogers & Graham, 2008), specific types of writing outcomes (Datchuk et al., 2020; Gillespie & Graham, 2014; Jagaiah et al., 2020), specific writing interventions (Graham & Harris, 2003), a single level of language (Feng et al., 2019; Datchuk et al., 2013), or specific grade levels (Cook et al., 2014). These prior reviews have helped to identify instructional strategies that have positive impacts on writing outcomes for students with LD. However, in narrowing the review of literature based on the described parameters, previous syntheses limit our understanding of the broader scope of research on writing interventions for students with LD.

### *The Current Study*

To address this gap, we chose to conduct a scoping review of experimental literature on writing instruction for students with LD. Although scoping reviews have traditionally been found in healthcare related fields, they have been more recently seen in education (e.g., O'Flaherty & Phillips, 2015). Munn and colleagues (2018) define scoping reviews as useful tools for identifying types of evidence, examining the ways research is conducted, and analyzing knowledge gaps in a particular field.

As such, they possess the potential to document the extent to which important factors related to writing instruction and implementation have been reported in prior research with students with LD. These factors may include, but are not limited to, student demographics, setting characteristics, the level of language addressed in interventions, and the types of writing outcomes assessed.

The purpose of the present study was to review and describe the scope of research conducted on writing interventions for students with LD. In addition to this being the first scoping review to focus on writing interventions for students with LD, it also extends previous systematic reviews and meta-analyses on the topic in several ways. First, this scoping review combines different design types (e.g., both group and single-case design studies) in a single review, providing a summary of all available experimental research on writing instruction for K-12 students with LD. Second, this review helps to clarify the degree to which a diverse range of students have been included in studies of writing instruction for students with LD. Third, in addition to highlighting characteristics of classroom settings and those who delivered writing interventions, this review summarizes writing interventions for K-12 students with LD by level of language and describes the writing outcomes of foci in available studies. Overall, this review provides important information about the current state of the field and the areas which have received less attention in writing intervention research for K-12 students with LD.

Given these extensions, aims, and purposes, this scoping review was guided by the following research questions:

In the available literature on writing interventions for K-12 students with LD,

1. what student demographics have been reported?
2. what classroom and interventionist characteristics have been reported?
3. what levels of language (i.e., letter/word, sentence, discourse) and writing outcomes have been reported?

## Method

This scoping review was conducted as a precursor to a systematic review and meta-analysis (Munn et al., 2018) examining the impact of writing interventions on the writing outcomes of K-12 students with LD. We outline our search and retrieval process for articles included in this review using the Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA) diagram (Page et al., 2021; Figure 1).

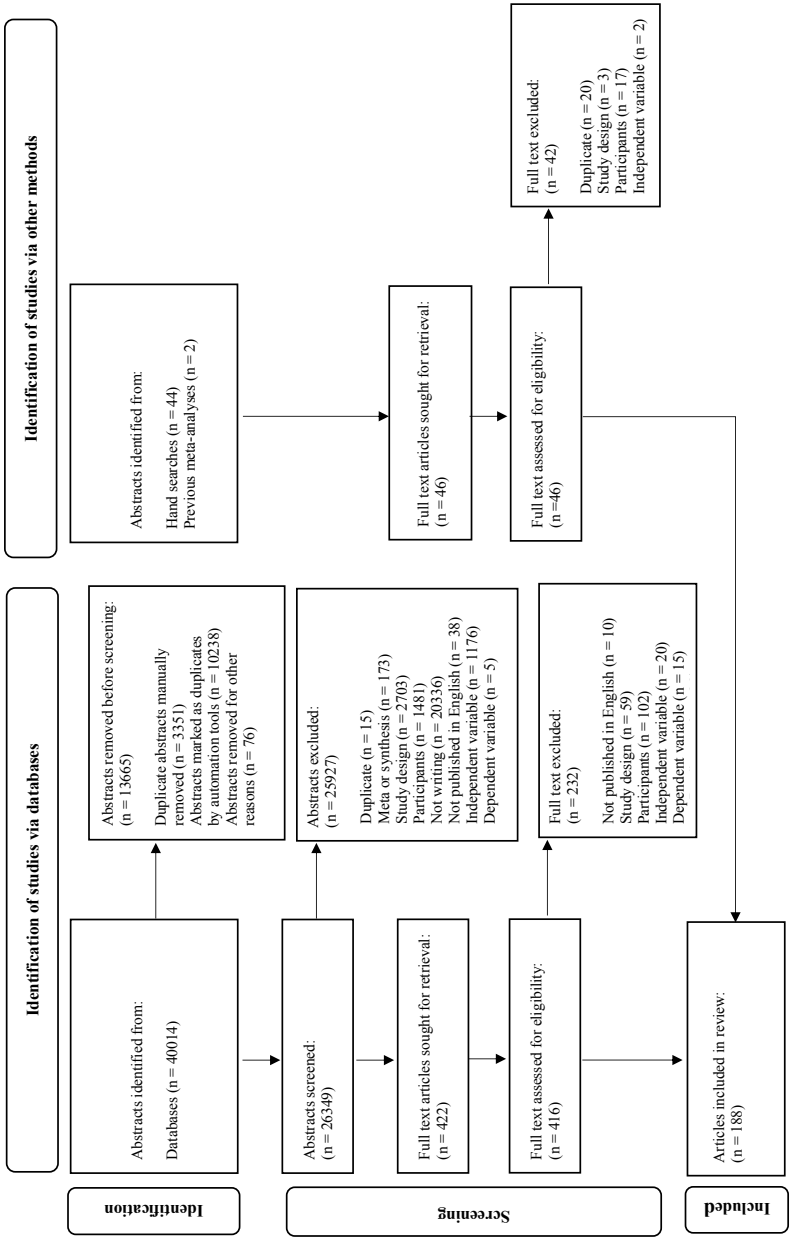


***Figure 1.*** **PRISMA Diagram for Search Procedures**

***Inclusion Criteria***

Studies included in this scoping review met inclusion criteria for (1) study design, (2) participants, (3) writing interventions, (4) writing outcomes, and (5) language of publication. We describe each of these in greater detail next:

1. Studies using experimental, quasi-experimental, within-subjects, and single-subject designs were all included in this review. Specifically, we included studies using group designs with randomized assignment of participants to conditions as well as quasi-experimental designs. For single-subject design studies, multiple baseline, AB, and ABAB designs (as well as variations on these, such as ABC) were all included. These studies needed at least three participants (Zelinsky & Shadish, 2018) that qualified under the participant criteria for this review.
2. Studies in this review included participants identified as having LD in grades kindergarten through 12. To ensure that other student factors did not confound results, we chose to focus on participants who were diagnosed with only LD. Studies that included students with comorbid disabilities, such as emotional/behavioral disorders or speech/language impairments, were excluded, as were studies including participants with LD who were also English language learners. We included studies with a variety of student participants, such as students with and without LD or students considered low achieving in addition to those with LD, if data could be disaggregated for students with only LD.
3. For the purposes of this scoping review, a writing intervention was defined as a writing activity, treatment, or instruction during which students composed letters, words, sentences, or connected text, either by hand or digitally. Studies included in this review needed to test the impact of a writing intervention compared to a no-treatment control or another writing intervention or test a writing intervention using an included single-subject design.
4. Studies included this review involved at least one measure of students' writing performance. Outcome measures could assess writing quality (e.g., using a rubric), quantity (e.g., total words written), or a combination of those measures. Because our review included transcription interventions, studies also included measures of correct spelling or handwriting.
5. Studies were required to be published in English to be included in this review.

***Search Procedures***

Our search was conducted in January of 2021 as part of a larger meta-analysis. Prior to, we reviewed previous relevant meta-analyses on similar topics (Gillespie & Graham, 2014; Collins et al., 2018; Ciullo et al., 2020; Graham et al., 2020) to help determine which databases and search terms to use. We also consulted the What Works Clearinghouse Procedures Handbook 4.1 (2020) for search guidance. Then, using the Academic Search Complete, APA Psych Info, Education Source, ERIC, SOC Index, ProQuest Dissertations and Theses, and WorldCat databases, we searched

using the following terms: *writing* AND "*learning disab**" OR "*learning diff**" OR "*struggling writers*" OR "*writing disab**" OR "*writing problems*" OR "*mild disab**". This search returned 40,014 articles.

In addition to the database searches, we conducted a hand search of the last three years of publications in the following journals: *Exceptional Children, Remedial and Special Education, Journal of Learning Disabilities, Journal of Special Education, Exceptionality, Learning Disabilities Research & Practice, Learning Disability Quarterly, Reading & Writing, Reading & Writing Quarterly,* and *Journal of Special Education Technology*. From this process, we located 44 additional studies for further review. We also checked the reference lists of meta-analyses on related topics and located an additional two studies for review.

***Selection and Coding of Studies***

After retrieving all relevant articles, we removed duplicates electronically using Mendeley software first and then removed duplicates manually. Next, we conducted several rounds of screening using our five identified inclusion criteria. Abstract screening was conducted in two phases: first, we screened abstracts from all database searches except for WorldCat using Abstrackr screening software (Wallace et al., 2012), and then we screened all abstracts pulled from the WorldCat database manually. A total of 422 articles were identified for full-text screening, but six studies were unable to be located using all available library retrieval processes. Therefore, we conducted a full-text screen of all remaining studies ($n$ = 416), plus the 46 studies identified through the hand search and review of previous meta-analyses. Qualifying studies that were published multiple times (e.g., a dissertation and journal publication by the same author that reported the same results) were combined and counted as one study. After full-text screening, 188 articles remained for inclusion in this scoping review. Because 3 articles contained multiple studies, a total of 194 individual studies were included and coded.

Each study was coded for a variety of variables, including general study information, as well as participant, intervention, and outcome characteristics. General study information included the year of publication; publication type (journal article, dissertation or thesis, conference paper, book chapter, or technical report); and type of study design (experimental, quasi-experimental, and single-subject). Single-subject designs were coded as AB, ABAB, or multiple baseline. Participant characteristics included students' grade level; gender; and ethnicity; along with the total number of participants; and how participants were identified with LD. For studies that did not specify a clear grade level (e.g., gave participants' average age in years), we created an age to grade level conversion. Starting with participants at 5 years old equaling kindergarten, we paired each subsequent age and grade through age 18, with 18 equaling a 12$^{th}$ grade level participant. Intervention characteristics included where the treatment took place (general education, special education, multiple settings) and who delivered the intervention (teacher, researcher/researcher assistant, peer, paraprofessional, multiple implementers). We also coded for the genre (argumentative, informative/explanatory, narrative, multiple) and type of writing students produced (handwriting, sentence writing, spelling, typing, extended composition, multiple) during intervention. Outcome characteristics included whether there was more than

one writing outcome measured and the types of writing outcomes assessed (quantity, quality, or both).

After developing clear definitions and a codebook (see online Appendix) for all variables to be coded, the three authors began by double coding three articles to become reliable and to refine the codebook. After that, the authors coded studies in batches, meeting first weekly, then biweekly to discuss coding challenges, address codebook changes, and avoid coder drift. Each author coded one-third of the included studies. For reliability of coding, each author double coded 9 studies from each of the other two authors (for a total of 54 double coded studies; 27.8% of the total sample). We calculated reliability of coding using percent exact agreement between coders. To do this, we calculated the number of agreements divided by the number of opportunities (agreements plus disagreements) times 100%. With 1632 total coding opportunities, there were only 159 total disagreements between coders (or 1473 agreements), resulting in high reliability of coding at 90%.

## Results

In this scoping review, we examined the characteristics of research studies involving writing interventions designed to impact the writing outcomes of K-12 students with LD. Next, we present overall study characteristics, followed by answers to our three research questions.

### *Overall Study Characteristics*

Table 1 presents study characteristics organized by the level of language focused on in intervention as well as characteristics across all studies. The 188 articles that qualified for our review included 194 individual studies (see Supplemental References in online Appendix). Studies included in this scoping review were published from 1976 to 2021. The largest percentage of studies (34%) was published in the decade from 1986 to 1995, with fewer publications in subsequent decades including 28% of studies published between 1996 and 2005 and 23% of studies published between 2006 and 2015. The most recent six years of publications made up 9% of the studies we reviewed, continuing a decreasing trend in publications. Most studies were published in academic journals (62%), with slightly over one-third (35%) published in dissertations or theses and the remainder published in technical reports (2%) and conference papers or proceedings (1%).

Most studies (58%) were group designs, with 33% quasi-experimental and 25% experimental (i.e., random assignment of participants to conditions) designs. The remaining studies were single subject designs (42%), with multiple baseline designs predominating (83%).

**Table 1.** ***Study characteristics by level of language in writing intervention***

| | *Level of Language in Intervention* | | | | |
|---|---|---|---|---|---|
| | Letter/word *N* = 11 | Sentence *N* = 6 | Discourse *N* = 148 | Multiple *N* = 25 | All studies *N* = 194 |
| Study Design | | | | | |
| Experimental | 4 | 3 | 33 | 5 | 48 |
| Quasi-experimental | 2 | 2 | 50 | 9 | 64 |
| Single subject | 5 | 1 | 65 | 11 | 82 |
| Publication Date | | | | | |
| 1976-1985 | 3 | 1 | 5 | 3 | 12 |
| 1986-1995 | 5 | 0 | 53 | 5 | 65 |
| 1996-2005 | 1 | 3 | 40 | 8 | 54 |
| 2006-2015 | 1 | 1 | 36 | 7 | 45 |
| 2016-2021 | 1 | 1 | 14 | 2 | 18 |
| Publication type | | | | | |
| Conference paper | 0 | 0 | 2 | 0 | 2 |
| Dissertation/thesis | 2 | 4 | 51 | 9 | 67 |
| Journal article | 9 | 2 | 93 | 14 | 121 |
| Technical report | 0 | 0 | 2 | 2 | 4 |
| *M* number of participants | 19.10 (15.27) | 22.67 (32.56) | 19.22 (22.78) | 29.00 (45.00) | 21.65 (28.11) |
| *M* grade level | 4.91 (3.13) | 7.83 (2.46) | 6.49 (2.22) | 7.00 (3.00) | 6.48 (2.36) |
| Setting | | | | | |
| General education | 0 | 2 | 16 | 3 | 21 |
| Special education | 7 | 1 | 76 | 12 | 97 |
| Multiple settings | 0 | 1 | 6 | 2 | 10 |
| Other | 2 | 1 | 17 | 5 | 25 |
| Outcome measure focus | | | | | |
| Writing quality | 1 | 1 | 23 | 2 | 28 |
| Writing quantity | 7 | 0 | 14 | 11 | 32 |
| Both | 3 | 5 | 111 | 12 | 134 |

*Note*. Some studies had characteristics coded as "CD" cannot determine, which impacts cell counts and row totals.

***RQ1: What student demographics have been reported?***

A total of 4,244 students were included in the studies we reviewed. Studies ranged from 3 ($n$ = 30 studies) to 207 ($n$ = 1 study) students, with an average of 21.65 students per study ($SD$ = 28.11). As would be expected, group designs had more participants, on average ($M$ = 35.83, $SD$ = 32.82), than single subject designs ($M$ = 5.02, $SD$ = 2.91). The mean grade level across studies was sixth grade ($M$ = 6.48, $SD$ = 2.36), with a range from first grade ($n$ = 3 studies) to twelfth grade ($n$ = 20 studies). Specifically, 29% of studies were conducted with elementary (i.e., grades K-5) students, 28% conducted with middle school (i.e., grades 6-8) students, and 16% conducted with high school (i.e., grades 9-12) students. Nineteen percent of studies included both students in elementary and middle school, while 5% included students in middle and high school and 3% included students from elementary, middle, and high school.

Across the studies we reviewed, demographic reporting varied. Participants tended to be male (66%). However, information about students' sex was not reported in 16% of studies. Information about participants' race was not reported in nearly half (47%) of studies. Of those that did report race, a majority of students were White (52%), followed by 26% African American and 12% Hispanic/Latino(a). An average of 8% of students identified as Other, with an average of 1% identifying as Asian/Pacific Islander and 1% identifying as multiple races. Less than 1% of student participants identified as Native American.

Information about LD identification varied, with most studies (75%) indicating students were identified by their school as having LD; this type of identification included IEP information, school testing data, and special education placement for students with LD. In the remaining studies, students were identified as having LD by researchers (4%) or by both researchers and their schools (16%). In five percent of studies, information about LD identification was not reported.

**RQ2: What classroom and interventionist characteristics have been reported?**

Slightly over one-fifth (21%) of studies did not report information about the classroom settings in which writing interventions were implemented. Of the studies that did report classroom setting information, half were conducted in special education classrooms (50%) which included resource rooms/pull-out environments, while 11% were conducted in general education classrooms and 5% in multiple settings. The remaining 13% of studies were conducted in settings coded as "other", which included school settings such as computer labs, cafeterias, and libraries and out-of-school settings such as university clinics and labs.

A variety of individuals delivered writing interventions to students with LD. The largest portion of studies (45%) involved researchers or research assistants as interventionists, while teachers delivered writing interventions in 34% of studies. Seven percent of studies included multiple types of interventionists, while 2% involved computer programs that delivered the intervention and 1% involved peers who delivered the writing intervention. In 11% of studies, information about who delivered the writing intervention was not reported.

***RQ3: What levels of language and writing outcomes have been reported?***

As shown in Table 1, studies with discourse-level (i.e., extended composition of one paragraph or more) writing interventions predominated (76%) our sample. The remaining studies involved interventions with multiple levels of language (13%), letter/word-focused interventions (i.e., handwriting or spelling; 6%) and sentence-level interventions (3%). Because discourse-level interventions predominated, these studies followed the trends already reported for the full sample of studies reviewed (i.e., mostly group, followed closely by single subject designs; mostly journal articles, followed by dissertations/theses; mostly conducted in special education classrooms; average number of participants near 20 and average grade level between sixth and seventh grade). However, there were several deviations from these overall trends for studies involving other levels of language in intervention. Studies with interventions at the sentence level were a majority group designs (83%) like the larger sample, but only one sentence-level study involved a single subject design. Studies with sentence-level interventions were also published mostly in dissertations/theses (67%), with only 33% published in journals.

Studies involving interventions focused on multiple levels of language tended to have more participants and a larger variation in number of participants ($M$ = 29.00, $SD$ = 45.00) than studies with letter/word ($M$ = 19.10, $SD$ = 15.27), sentence ($M$ = 22.67, $SD$ = 32.56), and discourse-level ($M$ = 19.22, $SD$ = 22.78) interventions. Studies involving letter/word-level interventions included younger students, on average ($M$ = 4.91, $SD$ = 3.13), than studies with interventions involving other levels of language. Sentence-level interventions included the oldest (i.e., highest grade level) students, on average ($M$ = 7.83, $SD$ = 2.46).

Across all studies we reviewed, more than one-third (36%) involved interventions that focused on narrative writing. Fifteen percent of studies involved informative or explanatory writing interventions and 15% involved multiple writing genres. The remaining studies included interventions focused on argumentative writing (13%) or we could not determine (12%) the focal writing genre in intervention. Importantly, in 9% of studies writing genre was not applicable, as these studies did not include extended writing interventions.

Most studies (89%) we reviewed included multiple assessments of students' writing performance or writing outcomes. Writing assessments focused on quality (e.g., holistic rubric scores), quantity (e.g., total words written), or both. Most studies (69%) included a focus on both writing quality and quantity outcomes, with 16% of studies focused on only quantity outcomes and 14% of studies focused on only quality outcomes. Notable exceptions to these overall trends included studies with letter/word-focused interventions that were a majority (64%) focused on writing quantity outcomes and studies with interventions at multiple levels of language that were relatively evenly split between a focus on both quality and quantity outcomes (48%) and a focus on only quantity outcomes (44%).

## Discussion

We conducted this scoping review, which serves as a precursor to an upcoming meta-analysis, to broadly examine how research has been conducted on experimental writing interventions for K-12 students with LD, providing an overview of

the types of evidence available and identifying gaps that exist in the current literature (Munn et al., 2018). Our systematic search resulted in 194 studies on this topic.

Although we were pleased to locate nearly 200 studies of writing interventions for students with LD and to provide a broad summary of the research that has been conducted in this area, we were concerned with a decreasing trend in publications. Studies of writing interventions for students with LD steadily declined after the mid 1990s at a rate of approximately 10 fewer studies per decade. At the current rate, that decline in publications will be even sharper for the decade from 2016 to 2025 (see Table 1).

We cannot be certain of the causes for decreasing numbers of publications of writing interventions for students with LD; the reasons behind the decline could be positive. For example, although there has been a decline in quantitative studies of writing interventions for students with LD, perhaps there has been an increase in studies using qualitative methodologies. A future meta-synthesis of qualitative studies on the topic would support or refute this idea. Furthermore, it may be that students with LD are being included in general education settings at such a high rate (estimates by the National Center for Education Statistics are that 73% of students with LD spend most of their school day in general education classes; NCES, 2022) that studies focused on their writing improvement specifically are less feasible within school settings.

Regardless of the cause of decreasing publications, we encourage continued research on writing interventions for students with LD. Because research indicates students with LD can experience persistent difficulties with written expression and tend to perform lower on multiple aspects of writing (i.e., handwriting, spelling, sentence fluency, writing quality) compared to nondisabled peers (Graham et al., 2017), continued research is needed. This research should include replications and extensions of previously researched interventions that positively impacted the writing of students with LD (e.g., dictation, goal setting, process writing, strategy instruction; Gillespie & Graham, 2014) as well as exploratory work to examine new types of writing interventions that may prove effective for students with LD and new combinations of interventions previously demonstrated as effective. If examining interventions within general education settings is more feasible, data for students with LD can be reported with the larger group and disaggregated, so the impact of intervention on the writing of students with LD specifically can be ascertained.

With continued research, we encourage the use of both group and single subject designs, as group designs predominated in our sample. Writing researchers have begun to use group and single subject designs paired within the same study (e.g., McKeown et al., 2016) to measure different aspects of intervention effectiveness, and this seems a promising direction for continued research on writing interventions for student with LD. Randomized controlled trials, which comprised only 25% of the studies we reviewed, are considered the gold standard in education research, but they often fail to provide perspective about the nuances of interventions and participants that may contribute to intervention effectiveness (Thomas, 2016). We encourage the use of multiple designs and multiple methods (i.e., both quantitative and qualitative) to discover what works for improving the writing of students with LD and under what conditions such interventions are most effective.

***Demographics***

Across the studies we reviewed, writing interventions were conducted with a range of students. Participants were, on average, in the middle grades (i.e., 6-8th grade), and interventions were conducted with a fairly even split between elementary school and middle school students (29% and 28% of studies, respectively). There were fewer (16%) studies conducted with high school students. However, research indicates that students with LD tend to struggle with writing skills and composition beyond elementary and middle school (Chalk et al., 2005; Graham & Perin, 2007), so it is important for future work to focus on high school students with LD. Because writing is essential for post-secondary and workplace success (Beaufort, 2008; Graham, 2019), interventions to support writing development need to continue into grades 9-12 to provide students with LD the skills they need to succeed not only in high school but also in college and on the job.

We were pleased to find that more than one-fourth of the studies examined writing interventions for students across school levels (e.g., elementary *and* middle school). We encourage continued research to examine writing interventions that are effective for students with LD across grade levels, which could lead to identification of practices that can be easily adapted and applied across the school years for students with LD. Such practices would cultivate continuity in the types of interventions provided for students with LD from year-to-year and provide a better understanding of how to prepare teachers at both the elementary and secondary levels to address the writing needs of students with LD. In other words, writing interventions that work at a variety of grade levels would allow researchers and teachers alike to get more "bang" for their instructional "buck" and would allow students with LD to practice and learn from predictable and consistent writing instruction across their schooling.

Unlike grade level, participants' demographic information in our sample provides opportunities for more transparent reporting in future studies, as nearly half (47%) of studies did not report participants' race and 16% did not report participants' gender. Of the studies in this review that reported demographic information, participants were predominantly male (66%) and white (52%). Given that writing development can vary by several important demographic variables, such as disability status, gender, race or ethnicity, and linguistic background (e.g., Fitton et al., 2021; Graham et al., 2017; Keller-Margulis et al., 2015, 2016), it is important to have a diverse range of participants to investigate potential differential effects of writing interventions. When researchers report gender and racial information about their samples, others can also better replicate interventions and better understand for whom interventions are effective.

***Classroom and Interventionist Characteristics***

Information about classroom and interventionist characteristics across the studies we reviewed provided important contextual details about writing interventions implemented with K-12 students with LD. Because 21% of studies did not report information about the classroom setting in which the writing intervention was delivered, lack of contextual information also points to a need for future researchers to clearly describe the settings and situations in which writing interventions are de-

livered to students with LD. With contextual information, interventions can be replicated, and findings can be generalized appropriately.

Of the studies that did report classroom information, most (50%) were conducted in special education classrooms, with only 11% conducted in general education settings. This finding seems problematic given that a majority of students with LD spend most of their school day in the general education classroom (NCES, 2022), but it may relate to feasibility. It is likely easier to pull students with LD out of their typical classroom settings to better control how an intervention is delivered; this possibility aligns well with our finding that 45% of our studies involved researchers or research assistants delivering the writing intervention, whereas teachers delivered the writing intervention in only 34% of the studies we reviewed.

We encourage future researchers to investigate the impact of writing interventions for students with LD that are delivered in students' typical classroom environments and delivered by their classroom teachers. These types of studies, with writing interventions scaled up for delivery by teachers and within natural school settings will allow for better understanding of classroom, teacher, school, and community factors that may impact feasible implementation of writing interventions for students with LD. Furthermore, research shows that providing effective writing instruction for *all* students can decrease student failure as well as decrease later identification of LD in students who are struggling in the general education classroom (Graham et al., 2009; Mason & Graham, 2008); thus, the benefit of writing interventions delivered to entire classrooms of students may extend beyond the target population of students with LD. Along with this recommendation, we also encourage increased university and in-service preparation for both general and special educators to teach writing, so that the writing instruction teachers provide is high-quality and aligned with research evidence.

***Level of Language and Writing Outcomes***

Examining the levels of language in interventions was essential for better understanding the focus of writing interventions for students with LD. We found that discourse-level (i.e., extended composition of a paragraph or more) interventions were implemented in more than three-fourths (76%) of all studies in our sample, with multiple levels of language (13%), letter/word (6%), and sentence-level interventions (3%) comprising less than one-fourth of all writing interventions for students with LD combined. We reasoned that the focus on specific writing genres and extended composition in the CCSS may have impacted the types of interventions researchers designed and implemented; this made sense given studies involving letter/word-level interventions tended to be conducted with younger students with LD, as prescribed in CCSS for elementary grade levels. However, research indicates that students with LD tend to demonstrate difficulties at all levels of language (Graham et al., 2017) and development at one level of language has been shown to increase performance at other levels (Kim & Schatschneider, 2017; Kim et al., 2011). An emphasis on extended composition (i.e., discourse level) interventions, while important, ignores the other levels of language that can influence the written composition performance of students with LD.

Because students with LD require a multifaceted approach to writing instruction with support in both writing skills and composition (Berninger et al., 1992; Datchuk & Kubina, 2013), we encourage future research that addresses letter/word and sentence-level interventions in addition to those that focus on discourse-level skills and strategies. Interventions that target multiple levels of language should also be developed and tested to capitalize on how increases in one level of language may impact student performance in the other levels (Kim et al., 2011). Furthermore, interventions across levels of language should be provided to students with LD across grade levels. Contrary to CCSS, students with LD may require intervention in handwriting and spelling skills (i.e., letter/word level) and sentence writing skills (i.e., sentence level) beyond the elementary grades (Troia & Olinghouse, 2013). We encourage future research that continues to incorporate transcription and sentence writing as stand-alone interventions or those combined with discourse-level interventions for older students with LD in middle *and* high school.

In contrast to a strong focus on one level of language, we were pleased to discover that most studies (89%) we reviewed used multiple assessments of writing performance and focused on both writing quality and quantity out comes for students with LD. We hope future research will continue with this trend, incorporating multi-dimensional assessments and multiple assessments of the writing of students with LD to provide a fuller picture of the impacts of writing interventions on their performance.

***Limitations***

Although we were transparent about our methods for conducting this scoping review, we understand there were limitations to our methods and analyses. First, the ways in which we selected, grouped, and coded studies in this review were likely influenced by our perspectives and experiences with writing and with students with LD. That is, another researcher or group of researchers from different backgrounds or differing theoretical perspectives may have chosen to group or code studies differently than we did. Additionally, to rule out potential confounds related to comorbid disabilities or needs associated with English language learning, we limited our sample to studies with students with *only* LD. However, we understand that comorbidities with LD (e.g., ADHD, speech/language disorders) are common (Margari et al., 2013) as are students with LD who are learning English as a second language (Lavin et al., 2021), so although we ruled out some variables, we know we limited our sample by this selection criterion. Another limitation of this review is that we focused only on quantitative research designs. We understand this decision neglects an entire body of qualitative research on writing interventions for students with LD that makes important contributions to the field. Relatedly, our scoping review was observational and descriptive. Moving forward, we plan to summarize the impact of the interventions in our sample in a meta-analysis, quantifying intervention effects in standard deviation units to guide decisions about treatment effectiveness. However, we could not make statements about the impact or effectiveness of writing interventions for students with LD with the methods used in this review.

### *Summary and Next Steps*

From this scoping review of writing interventions for K-12 students with LD, we have summarized the available quantitative research on this topic, identified areas of promise, and highlighted areas of weakness, or gaps in the research, that should be addressed in future work. Important next steps for the field include replication efforts to increase research on writing interventions for students with LD, especially interventions provided in students' typical classrooms and delivered by their classroom teachers with transparent reporting of student demographics as well as classroom and interventionist characteristics. Additionally, researchers should continue to consider the writing difficulties students with LD tend to display and focus on interventions targeted to multiple levels of language to best support these students. Importantly, the transcription and sentence-level needs of older students with LD should also be considered in future writing intervention studies. Overall, writing standards may serve as a guide for how to design effective writing instruction and intervention, but the strengths and needs of students with LD should drive future research and intervention.

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